Claims

What is claimed is:

1. Device for dosage of substances, with a substance intake portion (1; 15; 201; 301), which comprises at least one substance compartment (11; 110; 111; 115; 211; 311; 330) for the intake of substance (5; 50; 500) to be dosed, an emptying portion (2; 102; 202; 302) for the emptying of the at least one substance compartment (11; 110; 111; 115; 211; 311; 330) and a weighing balance (3; 503) for the determination of the quantity of dosed substance (5; 50; 500), characterised in that the substance intake portion (1; 15; 201; 301) comprises a plurality of substance compartments (11; 110; 111; 115; 211; 311; 330), which are individually emptiable, and the device comprises in addition control means, which control the emptying of the substance compartments (11; 110; 111; 115; 211; 311; 330) in a manner dependent on the quantity of dosed substance (5; 50; 500), which is determined by means of the weighing balance (3; 503).

2. Device according to claim 1, characterised in that the substance intake portion (1; 15; 201; 301) comprises substance compartments (11; 110; 111; 115; 211; 311; 330) of various size classes, with which various quantities of substance (5; 50; 500) to be dosed can be intaken.

3. Device according to claim 2, characterised in that least some of the size classes are graduated across at least a factor of 5, preferably in the ratio 1:2:5.

4. Device according to any one of claims 1 to 3, characterised in that at least some of the substance compartments (11; 110; 111; 115; 211; 311; 330) are pre-filled with substance (5; 50; 500) to be dosed and preferably are sealed.

5. Device according to any one of claims 1 to 4, characterised in that the substance compartments are formed by vertically arranged tubes (11; 110; 111; 211; 311; 330).

6. Device according to claim 5, characterised in that the tubes (11; 110; 111; 211; 311; 330) of different size classes have different inner diameters.

7. Device according to claim 5 or 6, characterised in that the inner diameters of the tubes (11; 110; 111; 211; 311; 330) are smaller than 5 mm, preferably smaller than 1 mm, more preferably smaller than 0.5 mm, in particular preferably smaller than 0.1 mm.

8. Device according to any one of claims 5 to 7, characterised in that at least some of the tubes narrow from the top to the bottom.

9. Device according to any one of claims 5 to 8, characterised in that at least some of the tubes (110; 111) have pointed or sharp-edged lower sections.

10. Device according to any one of claims 5 to 9, characterised in that at least some of the tubes (11; 110; 111; 211; 311; 330) are pre-filled with substance (5; 50; 500) to be dosed and preferably the two ends of the tubes (11; 110; 111;

211; 311; 330) are sealed with a foil (13, 14).

11. Device according to any one of claims 1 to 10, characterised in that at least some of the substance compartments (11; 110; 111; 115; 211; 311; 330) have an inner surface with an arithmetic mean roughness value R_a larger than 0.5 µm.

12. Device according to any one of claims 1 to 11, characterised in that it comprises various classes of substance compartments (11; 110; 111; 115; 211; 311; 330) with inner surfaces with different arithmetic mean roughness values R_a.

13. Device according to any one of claims 1 to 12, characterised in that at least some of the substance compartments (11; 110; 111; 115; 211; 311; 330) have on their inner surface flexible lamellae and/or barbs.

14. Device according to any one of claims 1 to 13, characterised in that it comprises various classes of substance compartments (11; 110; 111; 115; 211; 311; 330) with inner surfaces with different wettability.

15. Device according to any one of claims 1 to 14, characterised in that the substance intake portion (1; 15; 201; 301) is automatically removable from the emptying portion (2; 102; 202; 302).

16. Device according to any one of claims 1 to 15, characterised in that the substance compartments (11; 110; 111; 211; 311; 330) are individually mounted in the substance intake portion (1; 201; 301) and their number is variable.

17. Device according to any one of claims 1 to 16, characterised in that the substance compartments (11; 110; 111; 211; 311; 330) in the substance intake portion (1; 201; 301) are individually displaceably mounted between a fill position, in which they are fillable, and an inactive position, in which they are not fillable.

18. Device according to any one of claims 1 to 17, characterised in that it comprises means for vertical displacement of the substance intake portion (1; 15; 201; 301).

19. Device according to any one of claims 1 to 18, characterised in that the emptying portion (2) comprises means (22, 23) for the admission of pressure gas into every individual substance compartment (11).

20. Device according to any one of claims 1 to 19, characterised in that for every substance compartment (11) the emptying portion (102) has a displaceable piston (122).

21. Device according to any one of claims 1 to 20, characterised in that the emptying portion (202) has means for the alteration of the geometry of every individual substance compartment (211; 330), which preferably comprise means (222; 331, 332) for the production of a mechanical pressure, a voltage or a temperature change.

22. Device according to any one of claims 1 to 21, characterised in that the emptying portion (302) has means for the alteration of the surface properties of the inner surface of every individual substance compartment (311), which preferably comprise means (322, 331, 332) for the production of a voltage

and/or a temperature change.

23. Device according to any one of claims 1 to 22, characterised in that the emptying portion has means for the alteration of the flow properties of the substance to be dosed (5; 50; 500) in every individual substance compartment, which preferably comprise means for the production of a voltage or a temperature change.

24. Device according to any one of claims 1 to 23, characterised in that the emptying portion (2; 102; 202; 302) and the substance intake portion (1; 15; 201; 301) are arranged on the weighing balance (3), such that they are weighed by this weighing balance (3).

25. Device according to any one of claims 1 to 24, characterised in that the weighing balance (503) or a second weighing balance (503) is designed in order to receive a vessel (6) to be filled and to measure the weight of the vessel (6) and the substance (5; 50; 500) dosed into the vessel (6).

26. Method for dosage of substances with a device according to any one of claims 1 to 25, characterised in that a) by emptying at least one substance compartment (11; 110; 111; 115; 211; 311; 330) of a substance intake portion (1; 15; 201; 301) containing substance (5; 50; 500), substance (5; 50; 500) is dosed into a vessel (6); b) the quantity of dosed substance (5; 50; 500) is determined with a weighing balance (3; 503);

c) by control means it is calculated whether, and if need be, how much substance (5; 50; 500) is still to be dosed into the

vessel (6), and according to result, it is proceeded further with step a) or the dosage is ended.

27. Method according to claim 26, characterised in that the substance intake portion (1; 15; 201; 301) comprises substance compartments (11; 110; 111; 115; 211; 311; 330) of varying size classes, and firstly, of the largest possible size class, the greatest number of substance compartments (11; 110; 111; 115; 211; 311; 330) are emptied in which it is still certain that the desired dosage quantity is not overshot, then, of the next smaller size class, the greatest number of substance compartments (11; 110; 111; 115; 211; 311; 330) in which it is still certain that the desired dosage quantity is not overshot are emptied, etc. until the desired dosage quantity with the desired precision is achieved.

28. Method according to claim 26 or 27, characterised in that the quantity of dosed substance (5; 50; 500) is determined after every emptying of a substance compartment (11; 110; 111; 115; 211; 311; 330).

29. Method according to claim 26 or 27, characterised in that the quantity of dosed substance (5; 50; 500) is determined only after the emptying of several substance compartments (11; 110; 111; 115; 211; 311; 330).

30. Method according to any one of claims 26 to 29, characterised in that the substance compartments (11; 110; 111; 115; 211; 311; 330) are filled before step a) by dipping in or insertion in substance (5; 50; 500) which is found in a supply container (4), and then afterwards taken out of the substance (5; 50; 500) again.

31. Method according to claim 30, characterised in that the weighing balance (3) measures the weight loaded on it before and after filling of the substance compartments (11; 110; 111; 115; 211; 311; 330), and the control means calculates from this, and from the known geometry of the individual substance compartments (11; 110; 111; 115; 211; 311; 330), the approximate quantity of substance (5; 50; 500) in each substance compartment (11; 110; 111; 115; 211; 311; 330).

32. Method according to claim 30 or 31, characterised in that after the first, preferably after every, emptying of a substance compartment (11; 110; 111; 115; 211; 311; 330) of a size class, the approximate quantity of substance (5; 50; 500) in a substance compartment (11; 110; 111; 115; 211; 311; 330) of this size class is newly estimated.

33. Method according to any of one claims 30 to 32, characterised in that after the filling of the substance compartments (11; 110; 111; 115; 211; 311; 330) firstly at least one substance compartment (11; 110; 111; 115; 211; 311; 330) of each size class is emptied and by generation of the weight difference before and after the emptying of each substance compartment (11; 110; 111; 115; 211; 311; 330), the approximate quantity of substance (5; 50; 500) in a substance compartment (11; 110; 111; 115; 211; 311; 330) of this size class is determined.

34. Method according to any one of claims 26 to 33, characterised in that dosing firstly takes place in an intermediate container and when the desired dosage quantity with the desired precision is achieved, the intermediate container is emptied into the vessel (6); whereas if the desired dosage

quantity with regard to the desired precision is overshot, the intermediate container is emptied again and the dosage is begun again.

35. Method according to claim 34, characterised in that the actual dosage quantity in the intermediate container is determined by a second weighing balance, on which the intermediate container is fixed.